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AUTHOR Williamson, Mary
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ABSTRACT

The QuiltSpace Builder enables Microsoft's multimedia encyclopedia "Encarta" to "fit" into an established home or institutional learning environment so that "Encarta" can be used for productive research. Early observations of the difficulties encountered by Encarta users, coupled with a survey of presently available commercial software products, and a consideration of how technological innovation impinges on a learning environment, led to the development of the QuiltSpace Builder tool. The QuiltSpace Builder turns Encarta's "liabilities"--potentially the liabilities of other multimedia databases such as the World Wide Web--into assets and additionally supports existing and common computer expertise, frequently gaming expertise. The QuiltSpace Builder exploits new opportunities afforded by Web-based technologies and addresses a concern about an emerging gender gap in technological expertise. The QuiltSpace Builder tool was inspired by the American patchwork quilt and the quilting process. The paper describes the steps in quilting adapted for the QuiltSpace Builder to provide support for multimedia research projects: (1) user chooses macrocategory for research; (2) user creates focus for spaces with the Builder; (3) user creates working-name for spaces and plans search to anchor the multimedia search; (4) user selects symbols for the space; (5) user performs search (writes notes and copies media); (6) user rearranges spaces, chooses background and selects symbols; and (7) user okays the "look and feel" of the quilt. (Contains 17 references.) (Author/SWC)

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Integrating commercially-available educational software into a learning environment with the QuiltSpace Builder Tool¹

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Mary Williamson
Education in Mathematics, Science and Technology Division
The Graduate School of Education
4533 Tolman Hall
University of California
Berkeley, CA 94720
maryw@cogsci.berkeley.edu

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Abstract The QuiltSpace Builder enables Microsoft's multimedia encyclopedia *Encarta* to "fit" into an established home or institutional learning environment so that *Encarta* can be used for productive research. Early observations of the difficulties encountered by *Encarta* users, coupled with a survey of presently available commercial software products and a consideration of how technological innovation impinges on a learning environment, led to the development of the QuiltSpace Builder tool. The QuiltSpace Builder turns *Encarta's* "liabilities" (potentially, the liabilities of other multimedia databases such as the World Wide Web as well) into assets and additionally supports existing and common computer expertise, frequently gaming expertise. Finally, the QuiltSpace Builder exploits new opportunities afforded by Web-based technologies and addresses a concern about an emerging gender gap in technological expertise.

1. The QuiltSpace Builder tool

1.1. Why we need the QuiltSpace Builder tool

The QuiltSpace Builder is a tool designed to enable Microsoft's multimedia encyclopedia *Encarta* to "fit" into a learning environment. Moreover, the QuiltSpace Builder is as an exemplar of the new sorts of tools that software designers must build to afford the integration of commercially-available educational software into a technology-enhanced learning environment, in a home or institutional setting.

The need for a tool specifically designed to integrate *Encarta* into a learning environment was not immediately obvious. In an earlier project, twenty-four middle school age children were asked to find the answers to several research questions using *Encarta* '96. It was expected that the children would be more or less successful at finding the answers depending on their previous experiencing using print encyclopedias *and/or* other multimedia encyclopedias (including previous experience with *Encarta*), as described in an interview. It was assumed that there was some skill like "research expertise," acquired in either milieu, which the students would call on and which could be learned, with some modifications, for both the print and multimedia environments.

However, it became apparent that prior experience (or lack of experience) with *neither* kind encyclopedia mattered much to be successful with *Encarta*. Instead, the most successful *Encarta* users were those with

¹ Presented to the 1997 annual meeting of the American Educational Research Association, March 24-28, Chicago, IL, Session #42.41.

computer gaming experience (described in an interview), regardless of their research experiences. It should be noted, though, that no users were particularly successful at completing the research task. There was a very strong tendency for all users to become distracted by the media in *Encarta*, to have difficulty formulating keyword and category searches, and to quickly forget or lose track of the information they'd already found. The reason the computer gamers were more successful appeared to be that they were expert at rapid navigation and quick responses to media. Therefore, they found more information because they went faster. (Four middle school age children were also asked to complete the research task using World Book Encyclopedia and paper and pencil. These subjects were more successful at completing the research task than any of the subjects using *Encarta*. These subjects reported no more experience in research than the other subjects did.)

This early experience with *Encarta* users, coupled with a survey of presently available commercial software products and a consideration of how technological innovation impinges on a learning environment, led to the development of the QuiltSpace Builder tool. With respect to *Encarta* in particular, the QuiltSpace Builder is designed to afford research by introducing a tool which turns *Encarta's* liabilities (potentially, the liabilities of other multimedia databases such as the World Wide Web as well) into assets and which supports existing and common computer expertise, frequently gaming expertise. Additional and important considerations in the creation of the QuiltSpace Builder tool were a desire to explore the new opportunities afforded by Web-based technologies for learning environments and a concern for an emerging gender gap in technological expertise. Specific goals for the QuiltSpace Builder are summarized in Table I below.

Middle school students use <i>Encarta</i> alone	<i>Encarta</i> with proposed QuiltSpace Builder
User has difficulty discovering keyword and category terms	User is enabled to make personal and meaningful categories in the process of using the QuiltSpace Builder
User looks exclusively at media and is entertained, not necessarily informed	User is enabled to respond to media as one of the meaningful elements in the search
User responds to media in isolation ("gaming" expertise, rapid clicking on media), user gets "lost"	User is enabled to track navigation path while performing the search, responding to media as part of the search
User relies on word processor or paper and pencil for writing, can't use media except by cutting and pasting, turns in research report as hard copy	User is enabled to perform a multimedia search and present its results research project in multimedia format

Table 1: Integrating *Encarta* into multimedia learning environment

1.2. Traditional quilting as a model for the QuiltSpace Builder

The inspiration to use the American patchwork quilt and the quilting process as a model for the tool came after a consideration of what the "look and feel" of a multimedia research project might be like and a consideration of what existing activity the multimedia research task might resemble. American patchwork quilts developed into their peculiar American form in the mid-1850's, in response to a time of social change. They represented a tangible way for communities and individuals to both maintain their identities, commemorate life events and remember community members who had left or been left (Kolter, 1985; Torsney, 1994; Clark, 1995). A particularly salient aspect of these quilts is that they not only

commemorated events and were given as gifts (for weddings, births, leave-takings, funerals), they were also often *created at* these events, when the women in the community had the opportunities to be together. The needlework, choice of textiles, patterns and arrangements all have meaning in these quilts. There is a resemblance, on which I build, between the process and product of quilting and the process and product of the multimedia research project, as a response to social change and as an artifact created to communicate.

An example of an American patchwork quilt, an appliqué album quilt, made c. 1850 is shown below. There are aspects of this quilt that are worth mentioning, as I have adapted many of them into the QuiltSpace Builder. It has a border and twelve outer squares which frame the four central squares. The border and outer squares are appliquéed with conventionalized symbols (eagles, doves, peacocks, fruit and flowers in compotes) which are all part of the "Baltimore design vocabulary" (Kolter, 1985). These conventionalized symbols would have been recognized and "read" by the community. The central squares are much more distinctive, depicting Baltimore and Washington D.C. monuments and public buildings. Kolter speculates that the recipient of the quilt might have had "political aspiration," something which would have been known to the quilters. The aspects of the quilt which I have borrowed from the quilt are its border, which I believe frames or highlights the unique content of the center squares, the notion of conventionalized symbols, which I believe is an important part of establishing and validating community identity, and its distinctive center, which I believe focuses on the unique interests of a community member and/or a particular event.

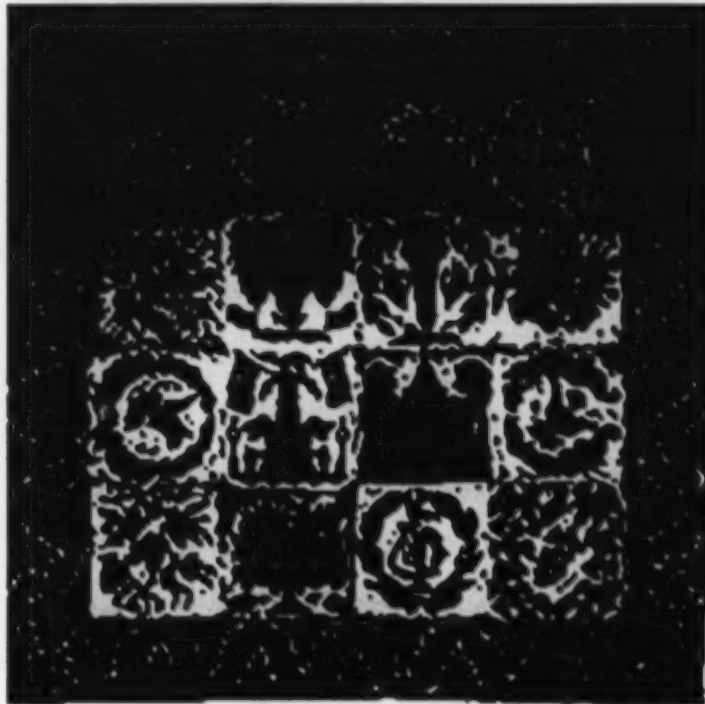


Figure 1: Appliqué album quilt, c. 1850, Baltimore, Maryland

It is also useful to stress that traditional quilting is a community-based American folk art. Traditional quilting has its roots in a deliberate practice of community building. These quilts were particularly valued as objects "made to express affection or concern for a family member" (Bernick, pg. 139). The Baltimore quilt presented above is an example of such a quilt, apparently created for a politically-savvy community member. In the QuiltSpace Builder, I would like to be able to appropriate this model of aesthetics-as-care and its assumptions about community and audience.

Finally, the theory of constructionism, as a description of learning, fits well as a description of quilting and provides a way of understanding the import of the pieces and the process of quilting. The relationship of designing and redesigning an artifact, a relationship found in quilting and in the QuiltSpace Builder, has been embedded in other constructionist projects. Gargarian's (1996) work, for example, suggests applications to musical composition and textiles. Kafai's (1995) work suggests applications to designing computer games.

1.3. Assembling the QuiltSpace Builder: A problem in transformative design

The notion of transformative design is a powerful one and may be applied to both creating transformations in the learning environment and transformation in the individual via the design of new technologies. Further, newly emerging technologies afford the possibility of socially responsible design. The QuiltSpace Builder is an attempt to create transformations within the individual and within the environment. In this way, it is similar to game design in a classroom by child programmers, which affords programming and design confidence and supports varied learning styles (Kafai, 1996), similar to fostering communication with and knowledge of expert practices, which affords new access to experts and their domains (Pea, 1994; Gordin, Polman and Pea, 1994), and similar to the integration of out-of-school knowledge and discourse patterns into the classroom via compact disks, videodisks and similar technologies, which affords broadened children's experiences (Scardamalia and Bereiter, 1994).

The QuiltSpace Builder addresses issues of concern in contemporary America: gender differences in learning styles and access and expertise in technology. The QuiltSpace Builder is proposed as one solution to these problems. The approach taken to the first issue draws explicitly on the distinctions between the planning and bricolage styles, and their consequences for acquiring technological expertise, pointed out by Turkle and Papert (1991). "Bricoleurs," Turkle and Papert point out, "construct theories by arranging and rearranging, by negotiating and renegotiating with a set of well-known materials" (p. 169). While it is not exclusively women's domain, Turkle and Papert point out that the bricolage style is one more predominately associated with women's learning style. The authors observe that this is *not* a style typically associated with the acquisition of engineering nor programming skills, skills often associated with men. Other work with girls has confirmed the differences in style and have suggested ways in which the bricolage style might be supported from *within* a technological environment (cf. Kafai, 1996). (The bricolage structure of traditional quilting has been discussed elsewhere, cf. Bilger, 1994.) Gender differences in access and acquisition of technological expertise has also been documented and is in issue of social concern (cf. Schofield, 1995; Papert, 1996). A focus of the QuiltSpace Builder project is the facilitation of girls' access and acquisition of technological familiarity and internet fluency.

2. Integrating commercially-available educational software into a learning environment

A learning environment is made up of a number of components, with potential "locations" into which *Encarta* and the QuiltSpace Builder might be placed. An interpretation of the components of the learning environment have been presented elsewhere.² The components most relevant to the QuiltSpace Builder and their importance are briefly summarized below.

The QuiltSpace Builder is an exemplar of an integrated internet networking approach to learning technologies. It is designed to be accessed from remote locations, at home, for example, as well as from within an institutional learning environment such as the classroom. Additionally, the QuiltSpace Builder was intentionally designed with commercially available and inexpensive software products (Adobe PageMill and Filemaker Pro).

² Bernard Gifford. The Distributed Mediated Learning Model. Presented to the 1997 annual meeting of the American Educational Research Association, March 24-28, Chicago, IL, Session #42.41.

In a technology-enhanced learning environment, there needs to be a way of integrating internet networking and communications. In a context of rapid technological change and additionally because of different learning styles, it may be that many students (and teachers) become behind and bewildered in cyberspace. My solution is to propose an instructional tool that supports different learning styles, particularly gender-related differences, flexible learning locations, and easy and cheap assembly.

The QuiltSpace Builder is an exemplar of an the integration of non-traditional resources. A provocative aspect of many newly emerging technologies is that they afford not only new opportunities for instruction and learning but also open up new possibilities for taking advantage of these opportunities. (Of course, this also brings up a critique of technological practices, the implication of which I won't explore here.) An important aspect of the QuiltSpace Builder is that it shows the possibility of fusing old and new crafts and technologies to afford new practices, chosen for their social value.

The QuiltSpace Builder is an exemplar of dynamic multimedia instructional text. It is designed to support and integrate collaborative, aesthetic and multimedia options. A number of authors have explored the relationship between creative style and the created multimedia artifact (cf. Gargarian, 1996; Lanham, 1993; Smith and Tabor, 1996). Creating dynamic instructional text which may, as is the case in the QuiltSpace Builder and elements in *Encarta*, not even *appear* as text (but appear instead as icons or media) is a way of broadening the opportunities for engagement with technology.

3. Using the traditional quilt as a model for design

3.1. Steps in the quilting process

I set out to reproduce, as a design experiment and as a model for design, the steps in the process of traditional quilting. The traditional patchwork quilt is constructed in several steps, some of which are conventionalized and localized. It afford the bricolage style. The practices of traditional quilting and their incarnation as elements of the QuiltSpace Builder are summarized in Table 2.

Traditional Quilting	QuiltSpace Builder: Support for multimedia research project
Quilter chooses quilt theme	User chooses macrocategory for research
Quilter creates design for individual quilt blocks	User creates focus for spaces with the Builder
Quilter drafts and revises paper-and-pencil designs for blocks	User creates working-name for spaces and plans search (to anchor the multimedia search)
Quilt makes patterns from designs	User selects symbols for the space
Quilter transfers stencils to fabric	User performs search (writes notes and copies media)
Quilter lays out fabric and looks at the individual blocks as a whole	User rearranges spaces, chooses background and selects symbols
Quilter stitches blocks together	User OKs the "look and feel" of the quilt

Table 2: Steps in quilting adapted for the QuiltSpace Builder

3.2. The QuiltSpace Builder's "look and feel"

I selected the American patchwork quilt as a model of community building and aesthetics. The QuiltSpace Builder incorporates a number of aspects of traditional quilting, both functional aspects and aesthetic aspects into its "look and feel." On its web-site as it is used in constructing a multimedia quilt, The QuiltSpace Builder resembles a traditional quilt. Figure 2a below shows a completed and an "empty" quilt space. The completed space shows its background and symbol. Figure 2b shows a note space which is linked to the completed quilt space (i.e. when the user clicks on "notes" in the QuiltSpace Builder page, a second web page appears for taking or showing notes). Figure 2b shows a note about Lewis and Clark, taken from *Encarta '97*.

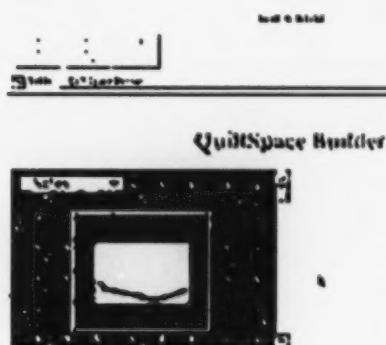


Figure 2a:
The QuiltSpace Builder

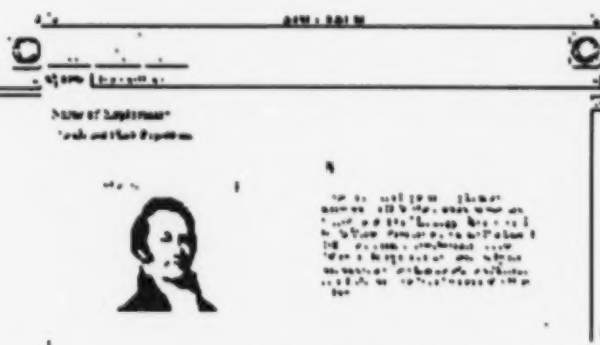


Figure 2b:
Note space (linked web page)

4. Affording competent research with *Encarta*

In a more recent study of *Encarta* users presently underway, four undergraduate students at the University of California at Berkeley were chosen to participate in a six week study in which they use *Encarta '97* and the QuiltSpace Builder. Each subject is interviewed about their typical research practices for their university coursework and interviewed about their strategies and expectations as they use *Encarta* to complete a research task and build a multimedia "quilt." The results of the interviews, conducted once per week over the course of the study, are to be incorporated into the iterative design of the QuiltSpace Builder. Not surprisingly, these undergrads are fluent and frequent web users and three of them own and have used *Encarta*. The goal of this second study is to observe older and demonstrably more competent researchers, researchers who regularly use multimedia resources in their own research, overcoming the many problems encountered by the younger novice researchers and then to incorporate these observations into a proposal for design of a tool to be used to afford the research of novice researchers.

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